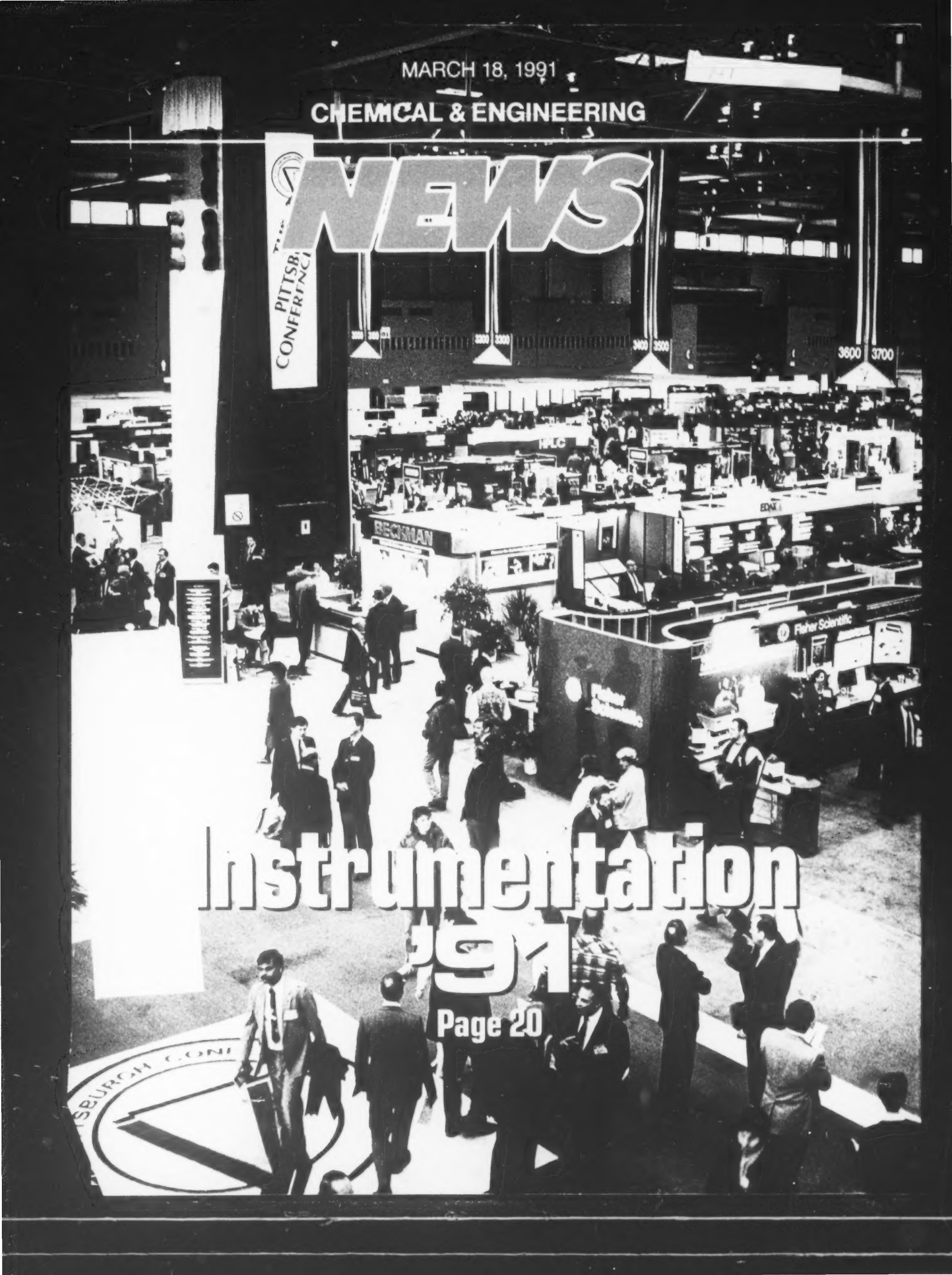
MARCH 18, 1991

CHEMICAL & ENGINEERING

NEWS



Instrumentation '91

Page 20

CHEMICAL & ENGINEERING NEWS

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MARCH 18, 1991

News of the Week

- **Stanford University officials faced Congressional fire during hearings into assertions that the college has been overcharging for indirect research costs.** Page 4
- **Congress readies for hearings on support for U.S. basic research, focusing on report from Office of Technology Assessment.** Page 5
- **By happenstance, EPA discovers that quicklime destroys PCBs, apparently leaving only harmless by-products.** Page 5
- **Ethylene oxide unit at Union Carbide's Seadrift plant in Texas explodes, killing one and injuring 19.** Page 6

Cover: Photo by C&EN's James Krieger

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Business

Growth in world production of synthetic fibers halts after nearly 10 years of increases; Crompton & Knowles' Alcorn receives CDA award. **Page 9**

Government

Concerned about Great Lakes' slow ecological progress, coalition of environmental groups pushes for zero discharge of chemical pollutants into lakes; tritium is key factor in plans to reconfigure nuclear weapons complex to make it smaller, safer, and cheaper to run; EPA commits to a strategy of halting pollution at source, saying it is most effective, less costly way to reduce risks. **Page 12**

Science/Technology

Chemical engineer, readying for possible role on space shuttle, sees opportunities in space R&D; California chemists develop microelectrode with rapid response capabilities for in-vivo neurochemical research; corporate sponsors sought for student science and engineering fair. **Page 16**

Books

"Hazardous Waste from Small Quantity Generators" offers valid points and policy alternatives, but leaves some questions unanswered. **Page 64**

ACS News

Few mass terminations of chemists reported recently; still, there have been a substantial number of unverified firings, and older chemists continue to bear the brunt of these. **Page 67**

Instrumentation '91

42nd edition of the Pittsburgh Conference & Exposition, held this year in Chicago, was organization's largest, with more than 950 exhibitors. Page 20

Chemical & Engineering News
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LETTERS

Supporting data

Sheila Tobias' book, "They're Not Dumb, They're Different: Stalking the Second Tier," which was capably and knowledgeably reviewed by George Bodner (C&EN, Oct. 15, 1990, page 69), is based on a small number of case studies that might arguably be called contrived. A skeptical reader might seriously question the generality of her conclusions based on such a limited data set.

However, support for the book's inferences is found in a report describing a comprehensive longitudinal study of several hundred students carried out at the University of Michigan and published in July 1989. Entitled "An Analysis of Factors Affecting Choices of Majors in Science, Mathematics, and Engineering at the University of Michigan," the brief but comprehensive report is available from the Center for the Education of Women at that university. The conclusions of that study map remarkably consistently on those of the Tobias work.

Robert L. Lichter
Executive Director
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Polymer science education

"Akron Burnishes New Image As Polymer Science Capital" (C&EN, Dec. 24, 1990, page 20) is a case study of how northeast Ohio's economy was revived by a devoted state government, local industries, and premier scientist-educators under Frank N. Kelley's expert directions. We at the University of Lowell Polymer Science Program proudly have alumni from the University of Akron (Sam Sawan) as well as from Case Western Reserve University (Sukant Tripathy). Having spent six years myself at the University of Akron from 1982 to 1988, I had firsthand experience of the exciting changes. I am sure we will continue to hear much exciting news from Akron and Case Western Reserve universities.

I would like to point out, however, that the University of Lowell boasts the oldest accredited B.S. program in plastics engineering in the nation. Since its introduction in 1954 (long before the foundation of the macromolecular science department at Case Western), more than 1200 students have graduated in plastics engineering. Enrollment has averaged 55 for the past 10 years. The chemistry and the plastics engineering departments also have a very successful joint polymer science/plastics engineering graduate program with more than 70 students, visiting scholars, and postdoctoral researchers. To indicate the size of our program, 13 Ph.D. degrees in polymer science/plastics engineering, 20 M.S. degrees in plastics engineering, three M.S. degrees in chemistry (polymer science), and 34 B.S. degrees in plastics engineering were awarded in 1989.

Rudolf Faust
Polymer Group Coordinator
University of Lowell, Mass.

Laboratory safety handbook

Jay Young's review of our book "Laboratory Health and Safety Handbook" (C&EN, Jan. 14, page 26) raises some valid points. It also reflects his personal bias as an author of a competitive work, as well as his limited knowledge in the field of industrial hygiene.

For example, Young's criticism of the omission of ASHRAE 110 as a hood performance test overlooks the fact that this test is neither intended for use in field performance validation, nor is it practical for such use. The hood performance evaluation techniques described in our book are not unreliable, and can actually be used by laboratory personnel (as opposed to the ASHRAE test).

Young criticizes the tone of the book as too conservative. This is a comment often made by chemists about health and safety advice, reflecting the presumption that laboratory workers are either smart enough to protect themselves or are immune to hazards. Unfortunate-

Corrections

- March 4, page 24: Jeff Back is business manager of adhesives and coatings at Kline & Co., not business manager of adhesives, sealants, and coatings for Findtech, Kline's business brokering subsidiary.
- March 11, page 69: In the listing of technical papers for the Atlanta spring national meeting, the Division of Geochemistry paper No. 21 should read "Comparative Biogeochemistry of Three Alkaline, Saline Lakes. **L. G. Miller,** R. S. Oremland, C. W. Culbertson. Paper No. 42 should read "Solid-State ^{13}C NMR and Carbon Isotope Studies of the Coupling of Primary and Secondary Production in a Florida Estuary. **W. T. Cooper,** Y. He, J. Chanton.

Growth in Fiber Output Halts after Nearly 10 Years of Increases

Although down a bit, U.S. still leads in worldwide fiber output with Western Europe the runner-up; only Asian nations record increased production

After nearly a decade of growth, world production of synthetic fibers stopped growing last year. That was the analysis, earlier this month, of Dutch chemicals and fibers maker Akzo, whose fibers and polymers division is one of the major global producers in the business.

Global fiber output totaled about 18.9 million metric tons last year, compared with about 19.0 million metric tons in 1989. However, Ugo G. Stark, president of Akzo's fibers and polymers division, warns that the 1990 estimate may be slightly optimistic: It may not reflect actual performance in the Eastern European countries, especially the U.S.S.R. The other striking point, he adds, was the decline in output in most product areas in the U.S. and Western Europe. Some two thirds of all fibers used in the industrialized countries are synthetic fibers.

The breakdown of world production by region shows little change from 1989. While Western Europe, with 18% of total world production, remained at the level of the previous year, the share of the U.S. in world synthetic fiber production dropped a percentage point, to 20%, from the year before. Despite a 3% growth in such production in Japan, that country's world share remained at 9%. The dropped percentage point, in turn, was taken up by other producers throughout the world, whose combined share reached 53% in 1990.

Economic difficulties in the U.S. led to a large decrease in production. Output of cellulosic fibers decreased 7% and of synthetics 6%. In Western Europe, total synthetic fibers production increased slightly, although cellulosic fibers were off by 1%.

The 1980s saw emergence of a trend toward filament yarns and this continued in 1990, the company reports. Similarly, the trend continued toward polyester and "other synthetics," primarily polypropylene, and away from acrylics and nylon, or polyamide. World production of nylon declined 1% last year in nearly all regions, ranging from a 3% slump in the U.S. to no growth elsewhere. The sole bright exception for nylon was Japan, where production grew 3%.

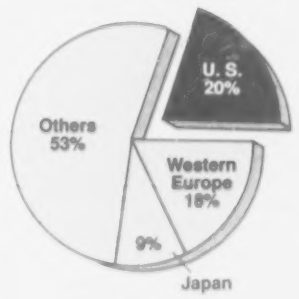
Polyester output was nearly flat in 1990; filament yarns grew 3% and staple fibers declined 2%. The U.S. was hardest hit, with production declining 11%. However, in Japan production was up 6%, and in the rest of the world up 4%. These areas now make up almost 64% of polyester production in the world, and capacities in these regions are still being added at a rapid pace, Akzo points out.

Acrylics production also decreased in 1990, although the rate slowed somewhat to a 2% decline. Only Western Europe showed a gain in production.

And production of "other synthetics," mainly polypropylene, increased more than 10% in 1990 with all regions showing growth. Production of these fibers is mainly in the U.S. and Western Europe.

Cellulosic fibers production declined worldwide by 4% in 1990, with the decrease more pronounced in filament yarns, off by 6%, than in staple fibers, down 3%. The slowdown was most pronounced in the U.S., where production fell 7%. Output by other nations was down 6%.

U.S. accounts for one fifth man-made fiber output



1990 production =
18.9 million metric tons

Source: Akzo fibers and polymers division

Worldwide polyester output has increased 30% since 1985

Millions of metric tons	1990	1985	1980	1975	1970
Cellulosics	**3.202**	**3.234**	**3.522**	**3.216**	**3.585**
Synthetics	**15.655**	**13.025**	**10.779**	**7.461**	**4.809**
Polyamide	3.757	3.387	3.234	2.462	1.924
Polyester	8.454	6.513	5.066	3.357	1.635
Acrylics	2.348	2.344	2.048	1.418	1.010
Other	1.096	0.781	0.431	0.224	0.240
TOTAL	**18.857**	**16.259**	**14.301**	**10.677**	**8.394**

The 6% drop was mainly attributable to production shutdowns in Eastern European countries. Environmental concerns in these countries make it doubtful that production will return to levels seen in the past, Akzo predicts.

At Akzo itself, fibers closed 1990 in a comparatively stable condition, says Stark. Performance varied considerably between the various regions and product groups, he says, but two thirds of the division's invested capital produced a return on investment that is "acceptable to very good." The remaining third consists of products still in development or startup or in problem areas, including carpet fibers and steel cord in Western Europe and Brazil.

Consolidated sales of the division in 1990 were $2.87 billion, 7% less than in 1989, mainly because of the lower level of shipments. Shipments totaled 400,000 metric tons, down 9% from 1989. Operating profits dropped 19% to $129 million. And capacity utilization in 1990 was about 84%, compared with 91% in 1989 and 1988.

Among the problem areas were carpet fibers, an area in which business was noticeably weaker, says Stark. Sales to Eastern Europe "were practically nil," and there was a general marked decline in exports to non-European countries. And in the loss-plagued steel tire-cord market, the company has decided to get out of the business; it will discontinue those operations by June.

Geographically, problems existed in Spain and Brazil. Spain is one of the weakest synthetic fiber markets in Europe, with a proliferation of many small manufacturing companies and, at present, an overvalued Spanish peseta, making cheaper imports attractive. The industry also has high financing costs, because of a 15% interest rate.

As for the Brazilian economy and the efforts the government there is making to stamp out inflation, according to Stark, the situation is very simple: "In the hands of our Lord." The economic problems of the country, sluggish sales to the local motor industry, and high financing costs had a serious effect on Akzo's earnings there last year.

Patricia Layman

David Alcorn receives marketing research award

The recipient of the Commercial Development Association's annual honor award, David S. Alcorn, told the group that "the successful commercial development manager in the future will have the ability to first define the needs of the customer and, second, to communicate this need clearly to the technical people in his organization. He thus becomes the initiator of research." Alcorn, vice president for dyes and chemicals at Crompton & Knowles, received the award at CDA's annual meeting in Philadelphia earlier this month.

As Alcorn noted in his award address, the commercial development manager is likely to have the title of marketing manager or product manager. In a small company, such a manager will truly be an entrepreneur, he says. The purpose of a commercial development manager today is to solve a customer's problem by selling an upgraded, more profitable product. And "while we may not be manufacturing or selling more pounds of product," he says, "in effect, we have added labor and cost to our starting product."

In this way, notes Alcorn, commercial development has come a long way from its initial phase in which chemists developed products, such as ethylene glycol, for which at first there were no commercial markets. Marketing meant publishing a chemical structure, giving away samples and hoping uses would develop. And they did. Ethylene glycol found use in antifreeze, explosives, resins, and fibers, notes Alcorn. In the second phase, market development managers began to sell products for specific markets such as solvents for coatings, vinyl plasticizers, and glycol antifreezes. "Instead of talking about chemical structures, we began using a new term—performance chemicals."

Although Alcorn notes that both commodity chemicals and performance chemicals are mature slow-growth markets now, growth in the third specialty phase "depends on the continuation of scientific research and the ability of creative commercial development people to do their job." He expects therefore that there will be no limit in the custom chemical manufacturing phase "based on the use of scientific knowledge to get improved products from limited raw materials."

A 25-year veteran of Union Carbide, who then joined J. T. Baker before his current tenure at Crompton & Knowles, Alcorn joins other past CDA award recipients such as Harold A. Sorgenti, president and chief executive officer of Arco Chemical; Air Products & Chemicals chairman and CEO Dexter F. Baker; and former Hercules chairman and CEO Alexander F. Giacco.

Also speaking at the CDA meeting was Madoka Tashiro, senior managing director of the Japanese chemical company Tosoh Corp., who pointed out that now is the time for western chemical concerns to secure a larger position in the Japanese chemical industry. There are no Japanese chemical companies among the 15 largest chemical firms worldwide and Japanese chemical firms do not have the global manufacturing and distribution abilities of competitors such as Dow Chemical, Du Pont, ICI, BASF, Bayer, and Rhône-Poulenc. Sumitomo, among the largest Japanese chemical concerns, has annual sales of about $6.5 billion, whereas the top 15 chemical firms' sales range between $9 billion and $26 billion. Tosoh itself has sales of about $3 billion.

Thus as Japanese domestic customers of chemicals for industries such as automotive and electronics globalize their production and search for chemical suppliers who can guarantee consistency and quality worldwide, the Japanese domestic chemical industry is at a disadvantage, says Tashiro. Japanese chemical companies must consolidate and form larger companies capable of expanding worldwide and investing the R&D dollars to support the development of new products as Tosoh itself is attempting to do. Alternatively, Japanese chemical companies will increasingly find themselves in positions where they must either sell out to, or form strategic alliances with, foreign chemical firms.

Marc Reisch

Job Security for Experienced Chemists Still Quite Vulnerable

There is both good news and bad news in the latest reports by the ACS Committee on Professional Relations (CPR) on the multiple termination of chemical professionals. The good news is that these reports, the 30th and 31st in a series dating back to 1974, each cover only three such incidents—the smallest number ever. They involve a total of 77 chemists and chemical engineers.

The bad news is that another 14 as yet unverified reports of such mass firings, involving as many as 350 chemical professionals, are under investigation. Another piece of news disturbing to CPR is that older chemists continue to bear the brunt of multiple terminations.

CPR defines a multiple termination as a situation in which the employment of three or more chemical professionals is terminated within a six-month period for reasons other than documented inadequate performance, completion of a contract, or cause.

In investigating multiple terminations, CPR seeks information from both terminees and employers. The committee believes the growing backlog of unconfirmed terminations is at least partly due to terminees' reluctance to cooperate with ACS. A related factor is an apparent increase in the use of secrecy clauses in individual termination agreements.

CPR is concerned that its conservative approach to reporting on multiple terminations may be understating the seriousness of the employment situation for chemists, especially older ones in industry. The committee has recently modified the questionnaire it sends to reported terminees in an effort to boost the low response rate.

The committee also may reconsider its guidelines on when it approaches an employer for details of a termination. The current practice is to do so only after reports from three individual terminees are in hand. To date, about two thirds of companies asked for such information provided it.

The six terminations detailed in the last two reports involved Allied-Signal, Bristol Myers, Chevron, DeSoto, Miles, and Reheis Chemical. They ranged in size from three chemists at Reheis to 30 at DeSoto. Another termination has been confirmed at PQ Corp., but this investigation is not yet complete.

As in previous reports, the performances of the employers involved were compared with standards contained in ACS's Professional Employment Guidelines (PEG). Five standards were used. They covered advance notice, severance pay, assistance in finding another job, extension of protection plans, and the involvement of longer term employees. Overall compliance was 53%. This was substantially higher than the average of 41% for the previous 29 reports.

The standard for longer term em-

Employer compliance with ACS employment guidelines

These employers provided information	Approximate number of employees separated	Advance notice	Severance pay	Assistance	Employee service	Protection plans
Allied-Signal (Morristown, N.J.)	14	☐	☑	☐	■	☐
Chevron (Richmond, Calif.)	6[a]	☑	☐	☐	☑	☐
DeSoto (Des Plaines, Ill.)	30	☐	☐	☐	■	☐
Miles (Elkhart, Ind.)	10	☐	☐	☐	■	☐
These employers provided no information						
Bristol Myers (Hillside, N.J.)	14	☑	☐	☐	■	☑
Reheis Chemical (Berkeley Heights, N.J.)	3	■	☑	■	■	☑

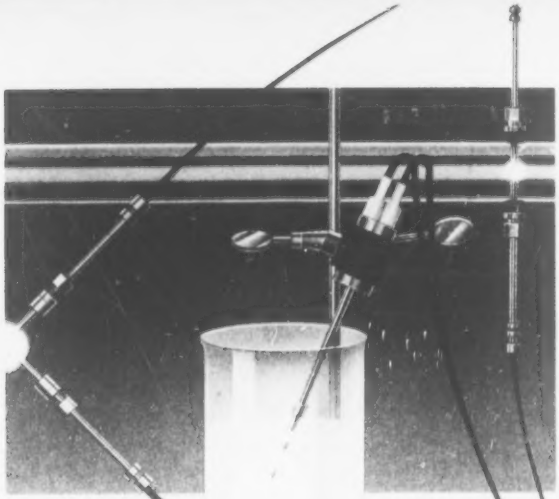
[a] Includes four concurrent retirements.

☐ Employer met or exceeded guideline standard.

☑ Two or more individuals below guideline standard, but average experience better than "substantially below" criterion.

■ Employer was substantially below guideline standard, which is defined as follows:

- Advance notice—less than two weeks.
- Severance pay—less than one week per year of service.
- Assistance—no assistance rendered.
- Employee service—more than 30% of terminees had 10 or more years of service.
- Protection plans—no continuation of protection plans.



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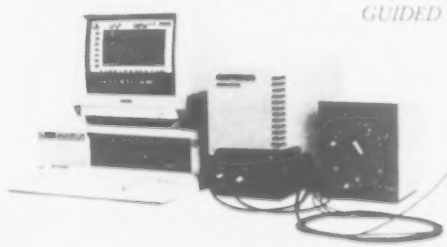

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CIRCLE 34 ON READER SERVICE CARD

ACS guidelines

Advance notice. Four-week minimum.

Severance pay. Minimum is two weeks per year of service. Additional notice may be given, by mutual agreement, in lieu of severance pay.

Assistance. Efforts should be made to place terminee in another position within the organization, or terminee should be given assistance to find employment elsewhere.

Pension plan vesting. Full vesting after five years' service.

Employee service. Those with minimum of 10 years' service should not be terminated except for continued evidence of previously documented inadequate performance or cause.

Employee protection plans. Should be extended for a minimum of one month, plus two weeks for each year of employee service, following termination, at same rate of contribution as before. Employee would have additional 31-day grace period.

ployees states that those with a minimum of 10 years of service should not be terminated except for inadequate performance or cause. For the about 250 terminations covered by all 31 CPR reports, it has been complied with only 22% of the time. But even this performance is declining. For the past nine reports dating back five years, only five of 60 employers complied.

All six employers covered in the last two reports violated this standard. Nine Bristol Myers terminees who reported to ACS had a minimum of 10 years of service and an average of 22. Similarly, 19 DeSoto terminees who reported to ACS had an average of 19 years of service.

Long-term compliance with the PEG standard of two weeks of severance pay for each year of service has not been good either, 22%. But in this case there is an improvement with 38% compliance over the past nine reports, including four of the six employers in the past two.

The standard calling for a mini-

Continued on page 72

J. Calvin Giddings wins 1991 Nichols medal

The ACS New York Section's William H. Nichols Medal will be presented March 22 to J. Calvin Giddings, Distinguished Professor of Chemistry, University of Utah, at the Nichols Distinguished Symposium, College of Mount Saint Vincent, Riverdale, N.Y. Giddings is being cited "for profound theoretical insights and outstanding innovations in separation science." The award is given annually to stimulate original research in chemistry.

Giddings received a Ph.D. in physical chemistry in 1954 under the direction of Henry Eyring. His thesis research dealt with topics in chemical kinetics, quantum chemistry, and chromatography. He did postdoctoral work on the theory of flames with J. S. Hirschfelder at the University of Wisconsin before joining the faculty at the University of Utah in 1957.

Winner of three ACS national awards, Giddings is recognized for research in almost all the fundamental aspects of chromatography. In 1967 he received the ACS Award in Chromatography & Electrophoresis; in 1980 the ACS Award in Analytical Chemistry; and in 1986 the ACS Award in Separations Science & Technology. He has also worked on the unification of separation theory, new separation methodology, electrophoresis, diffusion theory and measurement, and snow and avalanche physics. He invented, and with colleagues developed, the field-flow fractionation method for macromolecular separations.

Giddings authored "Dynamics of Chromatography" (1965); the 470-page textbook "Chemistry, Man, and Environmental Change" (1973); and the text "Unified Separation Science" (1991). In all, he has authored or coauthored more than 320 publications and edited 31 books. □

Special recognition to . . .

Daniel W. **Armstrong,** Curators' Professor of Chemistry, University of Missouri, Rolla, is the winner of the Martin Medal from the Chromatographic Society, Nottingham, U.K. He is being recognized for "his outstanding contributions to chromatography, particularly in the field of chiral discrimination." The award will be presented in May at the opening ceremony of the International Symposium on Chiral Discrimination in Rome.

Daniel **Bloch,** information and intellectual property manager, Johnson Wax, has received the ACS Milwaukee Section Award for "distinguished service to the profession of chemistry in the Milwaukee area." The highest honor awarded by the section, the award consists of a medal, a certificate and a stipend. Bloch is a past chairman of the Milwaukee Section, and is an adjunct professor of chemistry at the University of Wisconsin, Milwaukee.

Ajay K. **Bose,** George Meade Bond Professor of Chemistry, Stevens Institute of Technology, has been named 1990 New Jersey Professor of the Year by the Council for the Advancement and Support of Education. This award includes a $1000 prize sponsored by the Merck Co. Foundation. Bose is also the recipient of the Outstanding Achievement Award from the National Federation of Indian American Associations.

Stanley **Bruckenstein,** A. Conger Goodyear Professor of Chemistry, State University of New York, Buffalo, is the recipient of this year's Charles N. Reilley Award from the Society for Electroanalytical Chemistry. The award honors outstanding performance in electroanalytical chemistry. Bruckenstein was cited for being a pioneer in using very low level mass measurements to probe surface chemical and electrochemical reactions. He has used the technique to study many surface phenomena, including ion transport in conducting polymers.

Roberta F. **Coleman,** professor, department of chemistry and biochemistry, University of Delaware, is the winner of the ACS Delaware Section Award. She is being cited as "a leader in the field of enzyme structure, catalysis, and regulation." The pioneering research done in her lab has resulted in the synthesis and application of new purine nucleotide analogs that mimic naturally occurring compounds but are capable of reacting covalently at specific sites in enzymes and receptors. The award consists of a plaque and a stipend, and is given annually "to recognize conspicuous scientific achievement and contributions in an area of chemistry or chemical engineering by a member of the Delaware Section."

Lori **Engel,** University of Florida, Gainesville, is the winner of the 1990 Sherwin-Williams Student Award in Applied Polymer Science. This award is sponsored by Sherwin-Williams and administered through the joint Polymer Education Committee of the ACS divisions of Polymeric Materials: Science & Engineering and Polymer Chemistry. Engel, who is working toward her Ph.D., won for her paper, "Thermally Reversible Covalent Polymer Linkages I. Model Studies of the Azlactone Ring."

Allan S. **Hoffman,** professor of bioengineering and chemical engineering, University of Washington, has received the 1990 Biomaterials Science Prize from the Japanese Society for Biomaterials. This award is in recognition of "distinguished service in the advancement of biomaterials science." Hoffman is the first foreigner to receive the award, which was presented to him in Tsukuba, Japan. □

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mum of four weeks of advance notice was complied with in three of the six terminations covered in the past two reports. Long-term compliance is 40%. Long-term compliance with the requirement to extend employee protection plans beyond actual termination is at 50%, and 71% have met the standard for providing aid in finding another job.

Copies of termination reports as well as a summary of all terminations are available on request from the American Chemical Society, Office of Professional Services, 1155—16th St., N.W., Washington, D.C. 20036.

Michael Heylin